

**We Claim:**

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1. A method of extracting key frames from a video sequence, wherein the video sequence comprises compressed video data having motion vectors; the method comprising the steps of:
    - generating global motion signals based on the motion vectors;
    - generating dominant global direction clusters based on said generated global motion signals;
    - selecting key frames using said generated dominant global direction clusters; and10 decompressing said selected key frames to obtain said extracted key frames.
  2. A method as claimed in claim 1, wherein said selecting step comprises selecting key frames using said generated dominant global direction clusters and a set of predefined rules.
  - 15 3. A method as claimed in claim 1, wherein said selecting step comprises the sub-steps of:
    - selecting potential key frames of the video sequence using said generated dominant global direction clusters and a first set of predefined rules; and20
    - removing redundant key frames from said selected potential key frames using a second set of predefined rules resulting in said selected key frames.
  - 25 4. A method as claimed in claim 1, wherein said selecting step comprises the sub-steps of:
    - selecting potential key frames of the video sequence using said generated dominant global direction clusters and a first set of predefined rules;
    - removing redundant key frames from said selected potential key frames using a second set of predefined heuristic rules resulting in a set of said selected potential key frames; and30
    - removing similar and/or repeated key frames from said set of selected key frames using a colour histogram technique resulting in said selected key frames.

5. A method as claimed in claim 1, wherein said step of generating global motion signals comprise generating a pan global motion signal, a zoom global motion signal, and a tilt global motion signal.

5 6. A method as claimed in claim 1, wherein said dominant global direction clusters  
comprise one or more of a pan left, pan right, tilt up, tilt down, zoom in, zoom out and  
global still motion cluster.

7. A method as claimed in claim 1, wherein said step of generating dominant  
10 global direction clusters comprises the sub-steps of:

generating discrete global motion signals from said generated global motion signals;

removing noise from said generated discrete global motion signals; and

generating dominant global direction clusters based on said noise reduced discrete global motion signals.

15 discrete global motion signals.

8. A method of generating a representation of a video sequence, wherein said video sequence comprises compressed video data having block motion vectors, the method comprising the steps of:

20 decompressing the compressed video data to obtain said block motion vectors;

converting said block motion vectors to forward block motion vectors;

generating global motion signals based on the forward block motion vectors:

generating dominant global direction clusters based on said generated global motion signals:

25 selecting potential key frames of the video sequence using said generated  
dominant global direction clusters and a set of predefined rules;

removing redundant key frames from said selected potential key frames resulting in remaining selected key frames; and

30 decompressing said remaining selected key frames to obtain said representation  
of the video sequence.

9. A method as claimed in claim 8, wherein said step of generating global motion signals comprise generating a pan global motion signal, a zoom global motion signal, and a tilt global motion signal.

10. A method as claimed in claim 8, wherein said dominant global direction clusters comprise one or more of a pan left, pan right, tilt up, tilt down, zoom in, zoom out and global still motion cluster.

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11. A method as claimed in claim 8, wherein said step of generating dominant global direction clusters comprises the sub-steps of:

generating discrete global motion signals from said generated global motion signals;

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removing noise from said generated discrete global motion signals; and  
generating dominant global direction clusters based on said noise reduced

discrete global motion signals.

15. 12. A method of extracting key frames from one or more video clips, wherein each said video clip comprises MPEG compressed video data having block motion vectors, the method comprising the steps of:

partially decompressing the MPEG compressed video data to obtain said block motion vectors;

converting said block motion vectors to forward block motion vectors;

20. generating a pan global motion signal, a zoom global motion signal, and a tilt global motion signal based on the forward block motion vectors;

generating dominant global direction clusters based on said pan, tilt, and zoom generated global motion signals, wherein said dominant global direction clusters comprise one or more of a pan left, pan right, tilt up, tilt down, zoom in, zoom out and global still motion cluster;

25. selecting potential key frames of each said video clip using said generated dominant global direction clusters and a set of predefined rules;

removing redundant key frames from said selected potential key frames using a predefined set of heuristic rules resulting in a first set of remaining selected key frames;

30. removing similar and/or repeated key frames from said first set of remaining selected key frames using a colour histogram technique resulting in a second set of remaining selected key frames; and

decompressing said second set of remaining selected key frames to obtain said extracted key frames.

13. A method as claimed in claim 12, wherein said step of generating dominant global direction clusters comprises the sub-steps of:

5 generating discrete global motion signals from said generated global motion signals;

removing noise from said generated discrete global motion signals; and

generating dominant global direction clusters based on said noise reduced discrete global motion signals.

10 14. Apparatus for extracting key frames from a video sequence, wherein the video sequence comprises compressed video data having motion vectors; the apparatus comprising:

means for generating global motion signals based on the motion vectors;

15 means for generating dominant global direction clusters based on said generated global motion signals;

means for selecting key frames using said generated dominant global direction clusters; and

20 means for decompressing said selected key frames to obtain said extracted key frames.

25 15. Apparatus for generating a representation of a video sequence, wherein said video sequence comprises compressed video data having block motion vectors, the apparatus comprising:

means for decompressing the compressed video data to obtain said block motion vectors;

25 means for converting said block motion vectors to forward block motion vectors; means for generating global motion signals based on the forward block motion vectors;

30 means for generating dominant global direction clusters based on said generated global motion signals;

means for selecting potential key frames of the video sequence using said generated dominant global direction clusters and a set of predefined rules;

means for removing redundant key frames from said selected potential key frames resulting in remaining selected key frames; and

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means for decompressing said remaining selected key frames to obtain said representation of the video sequence.

16. Apparatus for extracting key frames from one or more video clips, wherein each said video clip comprises MPEG compressed video data having block motion vectors, the apparatus comprising:

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means for partially decompressing the MPEG compressed video data to obtain said block motion vectors;

means for converting said block motion vectors to forward block motion vectors;

means for generating a pan global motion signal, a zoom global motion signal, and a tilt global motion signal based on the forward block motion vectors;

means for generating dominant global direction clusters based on said pan, tilt, and zoom generated global motion signals, wherein said dominant global direction clusters comprise one or more of a pan left, pan right, tilt up, tilt down, zoom in, zoom out and global still motion cluster;

means for selecting potential key frames of each said video clip using said generated dominant global direction clusters and a set of predefined rules;

means for removing redundant key frames from said selected potential key frames using a predefined set of heuristic rules resulting in a first set of remaining selected key frames;

means for removing similar and/or repeated key frames from said first set of remaining selected key frames using a colour histogram technique resulting in a second set of remaining selected key frames; and

means for decompressing said second set of remaining selected key frames to obtain said extracted key frames.

17. A computer readable medium comprising a computer program for extracting key frames from a video sequence, wherein the video sequence comprises compressed video data having motion vectors; the computer program comprising:

code for generating global motion signals based on the motion vectors;

code for generating dominant global direction clusters based on said generated global motion signals;

code for selecting key frames using said generated dominant global direction clusters; and

code for decompressing said selected key frames to obtain said extracted key frames.

18. A computer readable medium comprising a computer program for generating a representation of a video sequence, wherein said video sequence comprises compressed video data having block motion vectors, the computer program comprising:

code for decompressing the compressed video data to obtain said block motion vectors;

code for converting said block motion vectors to forward block motion vectors;

code for generating global motion signals based on the forward block motion vectors;

code for generating dominant global direction clusters based on said generated global motion signals;

code for selecting potential key frames of the video sequence using said generated dominant global direction clusters and a set of predefined rules;

code for removing redundant key frames from said selected potential key frames resulting in remaining selected key frames; and

code for decompressing said remaining selected key frames to obtain said representation of the video sequence.

19. A computer readable medium comprising a computer program for extracting key frames from one or more video clips, wherein each said video clip comprises MPEG compressed video data having block motion vectors, the computer program comprising:

code for partially decompressing the MPEG compressed video data to obtain said block motion vectors;

code for converting said block motion vectors to forward block motion vectors;

code for generating a pan global motion signal, a zoom global motion signal, and a tilt global motion signal based on the forward block motion vectors;

code for generating dominant global direction clusters based on said pan, tilt, and zoom generated global motion signals, wherein said dominant global direction clusters comprise one or more of a pan left, pan right, tilt up, tilt down, zoom in, zoom out and global still motion cluster;

code for selecting potential key frames of each said video clip using said generated dominant global direction clusters and a set of predefined rules;

code for removing redundant key frames from said selected potential key frames using a predefined set of heuristic rules resulting in a first set of remaining selected key frames;

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code for removing similar and/or repeated key frames from said first set of remaining selected key frames using a colour histogram technique resulting in a second set of remaining selected key frames; and

code for decompressing said second set of remaining selected key frames to obtain said extracted key frames.

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